Electron and Optical Devices Technology Branch (RCE)

Conducts research and technology development of advanced microwave materials, devices and circuits, as well as the technologies required to integrate individual circuit components into microwave subsystems. Research on vacuum electronics is focused on improving efficiency, Radio Frequency (RF) power output, reliability, operating life, and communications qualities such as linearity of a traveling wave tube amplifier for use in space communications. Specific technologies of interest are electromagnetic and electrodynamic computer modeling and design; electron emission, including thermionic, field and secondary emission; electron beam formation and control; and application of micro-fabrication techniques to traveling wave tubes. In addition, RF power combining techniques at Ka-Band frequencies for traveling wave tube amplifiers are also of interest. Research is also conducted on semiconductor circuits for transmit and receive modules in the frequency range of interest to NASA's exploration initiative. Specific technologies under development include wide bandgap semiconductors, such as gallium nitride and silicon carbide; III-V semiconductors; Silicon Germanium; radio frequency micro-electromechanical systems (RF MEMS) devices/circuits; radio frequency integrated circuits, including transmission lines and passive components; and microwave.

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circuit packaging techniques. Cryo-cooled ultra-sensitive receivers for use in terrestrial antenna arrays for reception of signals from deep space and for inter-satellite links are of interest. Emerging technologies such as, multi-Gbs photonic and nanoelectronics based devices and circuits are also of interest. State-of-the-art computational, fabrication and experiment facilities are used to support activities.